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(71)出願人 000231235

日本酸素株式会社

東京都港区西新橋1丁目16番7号

(72)発明者 川口 晴生

東京都港区西新橋1-16-7 日本酸素株式会社内

(72)発明者 荒井 まどか

東京都港区西新橋1-16-7 日本酸素株式会社内

(72)発明者 多畠 英治

東京都港区西新橋1-16-7 日本酸素株式会社内

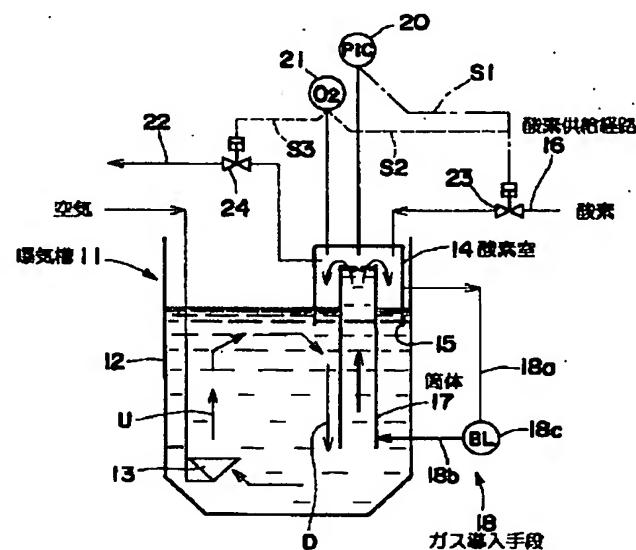
(74)代理人 弁理士 木戸 一彦 (外1名)

## (54)【発明の名称】 好気性水処理装置

## (57)【要約】

【課題】 混合液中への酸素の溶解効率を高めることができ、溶存酸素濃度を十分に上昇させることができる好気性水処理装置を提供する。

【解決手段】 曝気槽11の水面部に、底部にのみ設けた開口部15が水中に開口する箱状の酸素室14を設け、該酸素室内に酸素を供給する酸素供給経路16を設けるとともに、上端部が前記酸素室内に開口し、下端部が水中に開口する筒体17を設け、前記酸素室内のガスを前記筒体の下部に導入するガス導入手段18を設ける。



## 【特許請求の範囲】

【請求項1】 底部に設けた曝気手段からの曝気により槽内の混合液に旋回流を形成する旋回流式の好気性水処理装置において、前記旋回流における下降流部分の水面部に、底部にのみ設けた開口部が水中に開口する箱状の酸素室を設け、該酸素室内に酸素を供給する酸素供給経路を設けるとともに、上端部が前記酸素室内に開口し、下端部が水中に開口する筒状流路を設け、前記酸素室内のガスを前記筒状流路の下部に導入するガス導入手段を設けたことを特徴とする好気性水処理装置。

【請求項2】 前記筒状流路の下端部は、槽底部近傍に開口していることを特徴とする請求項1記載の好気性水処理装置。

【請求項3】 前記ガス導入手段から筒状流路の下部に導入するガスの量は、該ガスによるエアリフト効果で上昇する筒状流路内の混合液の流速が、前記下降流部分を下降する混合液の流速よりも速くなるように設定したことを特徴とする請求項1記載の好気性水処理装置。

【請求項4】 前記酸素室は、室内の酸素濃度を測定する酸素濃度測定手段を備えるとともに、該酸素濃度測定手段からの信号によって酸素の供給量を制御する酸素供給量制御手段を備えていることを特徴とする請求項1記載の好気性水処理装置。

## 【発明の詳細な説明】

## 【0001】

【発明の属する技術分野】 本発明は、好気性水処理装置に関し、例えば、活性汚泥法により下排水の処理を行う排水処理設備に用いられる旋回流式曝気槽に適した好気性水処理装置に関する。

## 【0002】

【従来の技術】 活性汚泥法により下排水の処理を行うための装置として、旋回流式曝気槽が広く用いられている。この旋回流式曝気槽は、例えば、図2の平面図に示すように、曝気槽1の底部一側に複数の散気装置2を並べて設置し、この散気装置2から空気等を噴出して散気装置上方部分の混合液に上昇流を形成することにより、散気装置2を設けていない他方の側壁側が下降流となる旋回流を形成したものである。このように曝気槽1内に旋回流を形成して被処理水(排水)と活性汚泥とが混合した混合液を攪拌することにより、活性汚泥濃度や溶存酸素濃度の均一化を図るとともに、槽底部に汚泥が堆積することを防止している。なお、排水の流入部や処理水の流出部は図示を省略する(以下同様)。

【0003】 一方、このような曝気槽を用いて下排水を活性汚泥法で処理する場合、混合液中の溶存酸素濃度が十分であることが求められるが、過剰な負荷によって一時に酸素不足になることがある。このような場合、従来は、溶存酸素濃度を補うために曝気に用いる空気量を増やしたり、曝気用空気とは別に酸素や空気を混合液中に散気したりするようにしている。しかし、単に酸素や

空気を混合液中に散気する方法では、気泡がすぐに水面上に浮上してしまうため、気液接触時間が不十分となり、酸素の溶解効率が低いという不都合がある。

【0004】 このようなことから、図3の縦断面図に示すように、曝気槽1とは別に密閉容器3を設け、この密閉容器3内に、配管4から酸素を供給するとともに、曝気槽1内の混合液をポンプ5で引き抜いて導入し、密閉容器3内で混合液と酸素とを接触させた後、配管6によって曝気槽1に戻すように形成した酸素補給装置が提案されている。また、この装置では、密閉容器3内での混合液と酸素との接触効率を高めるため、密閉容器3内にラシヒリング等の攪拌材7を投入するようにしている。

【0005】 上記構成の装置では、酸素が気泡としてではなく混合液中に溶解した状態で曝気槽1に送り込むことができるため、酸素が大気に放出されることがなく、供給した酸素のほとんどを有効に活用できるという利点を有している。

## 【0006】

【発明が解決しようとする課題】 しかし、上記図3に示すものでは、曝気槽とは別に密閉容器を必要とし、攪拌材やポンプ等の設備費が必要で、密閉容器内への混合液や酸素の圧入に動力費がかかる上、密閉容器の設置場所も必要となるという不都合があった。

【0007】 そこで本発明は、簡単な設備構成で混合液中の酸素の溶解効率を高めることができ、溶存酸素濃度を十分に上昇させることができる手段を備えた好気性水処理装置を提供することを目的としている。

## 【0008】

【課題を解決するための手段】 上記目的を達成するため、本発明の好気性水処理装置は、底部に設けた曝気手段からの曝気により槽内の混合液に旋回流を形成する旋回流式の好気性水処理装置において、前記旋回流における下降流部分の水面部に、底部にのみ設けた開口部が水中に開口する箱状の酸素室を設け、該酸素室内に酸素を供給する酸素供給経路を設けるとともに、上端部が前記酸素室内に開口し、下端部が水中に開口する筒状流路を設け、前記酸素室内のガスを前記筒状流路の下部に導入するガス導入手段を設けたことを特徴としている。

【0009】 さらに、前記筒状流路の下端部を槽底部近傍に開口させたこと、前記ガス導入手段から筒状流路の下部に導入するガスの量を、該ガスによるエアリフト効果で上昇する筒状流路内の混合液の流速が前記下降流部分を下降する混合液の流速よりも速くなるように設定したこと、前記酸素室に室内の酸素濃度を測定する酸素濃度測定手段を設けるとともに、該酸素濃度測定手段からの信号によって酸素の供給量を制御する酸素供給量制御手段を設けたことを特徴としている。

## 【0010】

【発明の実施の形態】 図1は本発明の好気性水処理装置の一形態例を示す概略図である。本形態例の曝気槽11

は、前記図2に示した曝気槽と同様に、平面形状が長方形のものであって、一方の側壁12の底面部には、槽内の曝気攪拌を行い、混合液に酸素を供給とともに、旋回流を発生させるための散気装置13が、側壁12と平行に一列に設けられている。この散気装置13から噴出するガス（空気）により、曝気槽11内には、矢印で示すような上昇流Uと下降流Dとを有する旋回流が形成される。

【0011】そして、上記旋回流における下降流Dの部分の水面部には、酸素室14が設けられている。この酸素室14は、底部のみが開口した箱状のもので、底部の開口部15が混合液中に開口するように設置されている。また、酸素室14には、室内に酸素あるいは酸素を含むガス（以下、これらを酸素含有ガスということがある。）を供給するための酸素供給経路16と、上端部が酸素室14内に開口し、下端部が曝気槽11の底部近傍の水中に開口する筒状流路を形成するための筒体17と、酸素室14内のガスを筒体17の下部に導入するガス導入手段18とが設けられている。

【0012】上記ガス導入手段18は、酸素室14内に連通する配管18a及び筒体17の下部に連通する配管18bと、ガスを圧送するためのプロワー（BL）18cとにより形成されており、プロワー18cを運転することにより、酸素室14内のガスが配管18aから配管18bを経て筒体17の下部に導入される。

【0013】すなわち、前記筒体17と上記ガス導入手段18とにより酸素室14部分にエアリフトポンプが形成され、筒体17内を上昇するガス（気泡）に同伴されて槽底部の混合液が筒体17内を上昇し、筒体17の上縁から酸素室14内に溢れ出す状態となる。このとき、筒体17の上縁及び下縁の位置は、適当に設定することができるが、筒体17をできるだけ長くすることにより、筒体17内を上昇する混合液とガス（酸素）との接触時間を十分にとることができる。また、筒体17の上縁は、筒体17から流出するガスの全量を酸素室14内に回収できる位置にすることが好ましく、通常は、逆流を防止するために水面より高い位置に設定する望ましい。したがって、筒体17の下縁を槽底部近傍に開口させるとともに、上縁を酸素室14内の水面から突出させた状態とすることが、混合液の攪拌作用や酸素の溶解効率を高める上で最適である。また、筒体17内にガスを吹き込む位置は、筒体17の中間部であってもよいが、下端部からガスを導入することにより、混合液とガスとの接触効率を高めることができる。

【0014】さらに、酸素室14には、室内の圧力を検出する圧力計（P I C）20と、室内のガス中の酸素濃度を測定する酸素濃度測定手段（酸素濃度計O<sub>2</sub>）21と、室内のガスを排出する排気管22とが設けられている。また、前記酸素供給経路16には、酸素の供給量を制御する酸素供給量制御手段（酸素供給弁）23が設け

られ、該酸素供給弁23の開閉駆動部には、圧力計20及び酸素濃度計21からの信号S1, S2がそれぞれ入力されている。さらに、前記排気管22には放出弁24が設けられており、該放出弁24の開閉駆動部には、酸素濃度計21からの信号S3が入力されている。

【0015】このように形成した酸素室14及び筒体17とガス導入手段18とからなるエアリフトポンプによって混合液中に酸素を溶解させる場合は、酸素供給経路16から酸素室14内に酸素含有ガスを供給するとともに、プロワー18cを運転してエアリフトポンプを作動させ、酸素室14内の酸素含有ガスを駆動ガスとして槽底部の混合液を酸素室14内に向けて揚液する。この揚液中、筒体17内で混合液とガスとが乱流状態で接触し、混合液中の酸素の溶解が促進され、酸素が十分に溶解した混合液と、溶解しなかった酸素を含むガスは、エアリフトポンプの出口である筒体17の上縁から酸素室14に流出する。

【0016】エアリフトポンプから流出した酸素含有混合液は、酸素室14の下部開口部15から曝気槽11内に戻り、旋回流に乗って曝気槽11内に分散する。一方、酸素含有ガスは、酸素室14内から配管18aに吸引され、ガス導入手段18によって筒体17の下部に循環する。

【0017】したがって、混合液中に溶解しなかった酸素は、大気に放出されることなく酸素室14からガス導入手段18によって筒体17に循環するので、無駄に放出される酸素量がほとんどなくなり、供給した酸素を有效地に活用することができる。しかも、曝気槽11とは別に密閉容器を設ける必要がなく、必要な動力費はプロワー18cのみであり、酸素室14内への酸素含有ガスの供給も略常圧で行えるので、従来の酸素補給装置に比べて設備費や動力費を低減することができ、既存設備への対応も容易に行うことができる。

【0018】また、ガス導入手段18によって筒体17の下部に導入するガス量（循環ガス量）は、筒体17の長さや太さによって異なり、筒体17内に混合液の上昇流を形成できれば、任意の循環ガス量を選択できるが、エアリフト効果で上昇する筒体17内の混合液の流速が、前記下降流D部分を下降する混合液の流速よりも速くなるように循環ガス量を多めに設定することにより、筒体17内での混合液と酸素との接触効率を高めることができるとともに、筒体17から流出した酸素溶存水の下降流Dへの分散効率も高めることができ、曝気槽11内の混合液全体に効率よく酸素を供給することができる。

【0019】上述のようにして酸素室14から混合液中に酸素を供給していくと、酸素分が混合液中に溶け込む量に応じて酸素室14内のガス量が減少するので、酸素室14内の圧力が低下する。この酸素室14内の圧力が、所定圧力以下に低下すると、前記圧力計20がこれ

を検出して前記酸素供給弁23に開弁信号を出力し、酸素供給経路16から酸素室14内に酸素含有ガスを供給する。また、圧力が所定圧力以上に上昇した場合は、圧力計20から酸素供給弁23に閉弁信号が出力される。

【0020】一方、酸素室14内に、酸素含有ガスとして高純度酸素を供給した場合でも、混合液中から酸素室14内に浮上する気泡には、炭酸ガスや窒素が含まれているため、酸素室14内には、次第にこれらが蓄積されることになり、酸素の溶解効率も低下していくことになる。このように、酸素室14内の酸素濃度が所定濃度以下になると、前記酸素濃度計21がこれを検出し、前記酸素供給弁23に開弁信号を出力するとともに、前記放出弁24にも開弁信号を出力し、酸素供給経路16からの酸素含有ガスで室内のガスを放出弁24から押し出すようにする。これによって酸素室14内の酸素濃度が所定濃度以上になると、酸素濃度計21は、酸素供給弁23及び放出弁24に閉弁信号を出力する。なお、酸素室14内の酸素濃度は任意であり、酸素供給経路16から大気を供給してもそれなりの効果は得られるが、酸素あるいは酸素富化ガスを室内に供給して室内の酸素濃度を大気中の酸素濃度である21%を超える濃度、好ましくは80%以上の濃度になるように制御することにより、酸素の溶解効率を大幅に向上させることができる。

【0021】また、酸素室14から混合液中への酸素の供給運転は、プロワー18cを運転することにより行われるが、この運転は、連続的に行ってもよく、適当に設定した間隔で間欠的に行ってもよい。さらに、曝気槽11内の混合液の溶存酸素濃度を溶存酸素濃度計(図示せず)で測定し、溶存酸素濃度が所定濃度以下になったときに行うようにしてもよい。また、前記圧力計20や酸素濃度計21のような制御手段を設けずに、運転中は、酸素供給経路16から僅かに過剰の酸素含有ガスを連続的に供給し、酸素室14の底部の開口部15から室内のガスを混合液中に僅かずつオーバーフローさせることにより、室内の酸素量の減少や酸素以外のガスの蓄積をある程度に抑えることができる。

【0022】さらに、酸素室14は、曝気槽11の大きさや、必要とする酸素供給量に応じて複数個を設置することもでき、酸素室14内に複数の筒体17(エアリフトポンプ)を設けることもできる。また、エアリフトポンプを形成するための筒状流路は、曝気槽11の槽壁を利用して形成することも可能であり、例えば、槽角部に仕切板を設置して断面三角形状の筒状流路を形成することもできる。

【0023】また、前記圧力計20に代えて酸素室14

内の液面を検出する液面計を設置し、室内の圧力変動に伴う液面の上下動を検出して前記酸素供給弁23の開閉制御を行うようにしてもよい。さらに、曝気槽11がドラフトチューブ型のものであっても同様の効果を得ることができ、酸化接触方式による好気性水処理装置にも適用が可能である。

#### 【0024】

【実施例】幅60cm、奥行き40cm、深さ50cmのガラス製水槽を曝気槽として用いて実験を行った。酸素室には、透明プラスチック製で、直径10cm、深さ7cmの有底円筒状のものを用い、筒体には、直径5cm、長さ30cmの透明プラスチック製パイプを用いた。また、筒体は、上端が水面から上になるように設置した。圧力計は、酸素室内の圧力が大気圧になったときに酸素供給弁を開き、圧力が大気圧+10mmAqになったときに酸素供給弁を閉じるように設定した。また、酸素濃度計は、酸素室内の酸素濃度が80%まで低下したら酸素供給弁及び放出弁を開き、酸素濃度が90%に上昇したら酸素供給弁及び放出弁を閉じるように設定した。

【0025】この実験装置を使用して清水での総括酸素移動容量係数(KLa)を測定した。その結果、散気装置から空気を毎分10リットルで曝気しただけの場合には、総括酸素移動容量係数が6であったのに対し、酸素室に酸素ガスを供給するとともに、プロワーを運転して毎分5リットルのガスを筒体下部に供給してエアリフトポンプを作動させた場合は、総括酸素移動容量係数が18に向上した。

#### 【0026】

【発明の効果】以上説明したように、本発明の好気性水処理装置によれば、混合液中への酸素供給量を増大させることができるので、十分な溶存酸素濃度で効率のよい水処理を行うことができる。

#### 【図面の簡単な説明】

【図1】 本発明の好気性水処理装置の一形態例を示す概略図である。

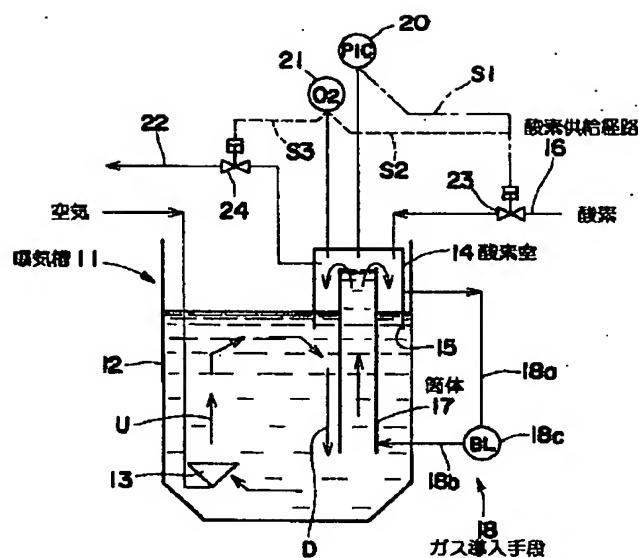
【図2】 旋回流式曝気槽の一例を示す平面図である。

【図3】 従来の酸素補給装置の一例を示す縦断面図である。

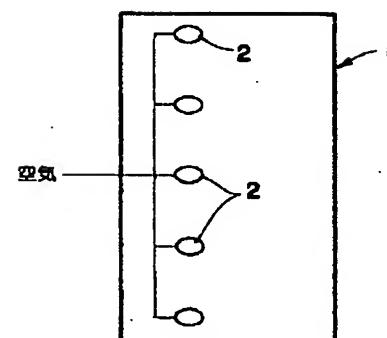
#### 【符号の説明】

11…曝気槽、12…側壁、13…散気装置、14…酸素室、15…開口部、16…酸素供給経路、17…筒体、18…ガス導入手段、18c…プロワー、20…圧力計、21…酸素濃度計、22…排気管、23…酸素供給弁、24…放出弁、D…下降流、U…上昇流

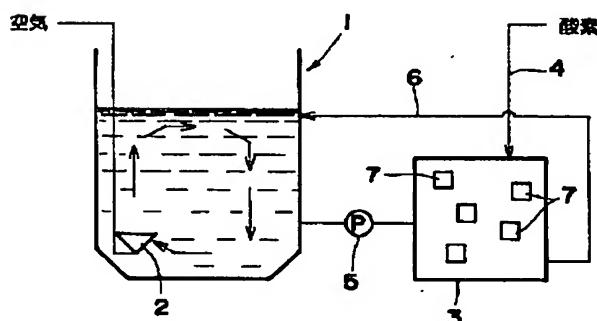
【图 1】



〔図2〕



【図3】



Partial English translation of JP-A-11-19678 (Ref.4)

(page 2, left column, lines 1 to 29)

[Title]

AEROBIC WATER TREATMENT DEVICE

[Claims]

1. Rotary flow aerobic water treatment device in which by aeration air from an aeration means provided at a bottom part, rotary flow is formed in mixture solution in the tank, comprising: a box shaped oxygen chamber in which an open part provided only at a bottom part is opened in water at the water surface part of descending flow part of the rotary flow; an oxygen supplying passage supplying the oxygen into the oxygen chamber; a cylindrical passage in which an upper end part is opened to the inside of the oxygen chamber and a lower end part is opened in the water; a gas introducing means introducing the gas in the oxygen chamber to the lower part of the cylindrical passage.
2. The aerobic water treatment device according to claim 1, wherein the lower end part of the cylindrical passage is opened at the vicinity of the bottom part of the tank.
3. The aerobic water treatment device according to claim 1, wherein the amount of gas introduced to the lower part of the cylindrical passage from the gas introducing means is set so that the flow rate of the mixture solution in the cylindrical passage, ascending by means of an air lifting effect due to the gas becomes faster than the flow rate of the mixture solution descending in the descending flow part.
4. The aerobic water treatment device according to claim 1, wherein the oxygen chamber includes an oxygen concentration measuring means measuring the oxygen concentration in the chamber and an supply amount controlling means controlling the oxygen supply amount by a

signal from the oxygen concentration measuring means.

[Detailed Description of the Invention]

[0001]

[Technical Field of the Invention]

The present invention relates to an aerobic water treatment device, for example it relates to an aerobic water treatment device suitable for a rotary flow aeration tank used for a waste water treatment plant in which black/waste water is treated by means of active sludge method.

(page 4, right column, lines 7 to 45)

[0024]

[Embodiment Example]

Using a 60 cm width, 40 cm length, and 50 cm depth water tank made of glass as an aeration tank, an experiment was carried out. As an oxygen chamber, a 10 cm diameter and 7 cm depth cylindrical chamber having a bottom and made of transparent plastics was used, and, as a cylindrical body, a 5 cm diameter and 30 cm length pipe made of transparent plastics was used. Moreover the cylindrical body was installed so that the upper end becomes upper than water surface. A pressure gauge was set so that an oxygen supplying valve was opened when the pressure in the oxygen chamber becomes to atmospheric pressure, and the oxygen supplying valve was closed when the pressure becomes to atmospheric pressure + 10 mmAq. Moreover, the oxygen analyzer was set so that the oxygen supplying valve and a discharging valve were opened when the oxygen concentration in the oxygen chamber lowered to 80%, and the oxygen supplying valve and the discharging valve were closed when the oxygen concentration in the oxygen chamber raised to 90%.

[0025]

Using the experimental device, overall volumetric oxygen transfer coefficient ( KLa) in fresh water was

measured. As a result, when air was aerated only 10 litters per minute from an air diffusing device, the overall volumetric oxygen transfer coefficient was 6, on the contrary, when oxygen gas was supplied into the oxygen chamber and an air lift pump was operated by driving a blower and supplying 5 litters per second gas into the lower part of the cylindrical body, the overall volumetric oxygen transfer coefficient improved to 18.

[0026]

[Effect of the Invention]

As described above, according to the aerobic water treatment device of the present invention, the oxygen supply amount in the mixture solution can be increased, thereby, an efficient water treatment can be carried out under a sufficient dissolved oxygen concentration.

[Brief Description of Drawings]

Fig. 1 is a schematic view illustrating an embodiment example of an aerobic water treatment device of the present invention;

Fig. 2 is a plane view of an example of an rotary flow aeration tank; and

Fig. 3 is a longitudinal cross-sectional view of an example of a prior art oxygen supplying device.

[Description of Reference Numerals]

11	AERATION TANK
12	SIDE WALL
13	AIR DIFFUSING DEVICE
14	OXYGEN CHAMBER
15	OPEN PART
16	OXYGEN SUPPLYING PASSAGE
17	CYLINDRICAL BODY
18	GAS INTRODUCING MEANS
18c	BLOWER
20	PRESSURE GAGE
21	OXYGEN ANALYZER
22	EXHAUST PIPE
23	OXYGEN SUPPLYING VALVE

24           DISCHARGING VALVE  
D           DESCENDING FLOW  
U           ASCENDING FLOW

# AEROBIC WATER TREATMENT DEVICE

Publication number: JP11019678

**Publication date:** 1999-01-26

**Inventor:** KAWAGUCHI HARUO; ARAI MADOKA; TABATA EIJI

**Applicant:** NIPPON OXYGEN CO LTD

### **Classification:**

**- International:** **C02F3/00; C02F3/12; C02F3/00; C02F3/12; (IPC1-7):**  
**C02F3/12; C02F3/00; C02F3/12**

- European:

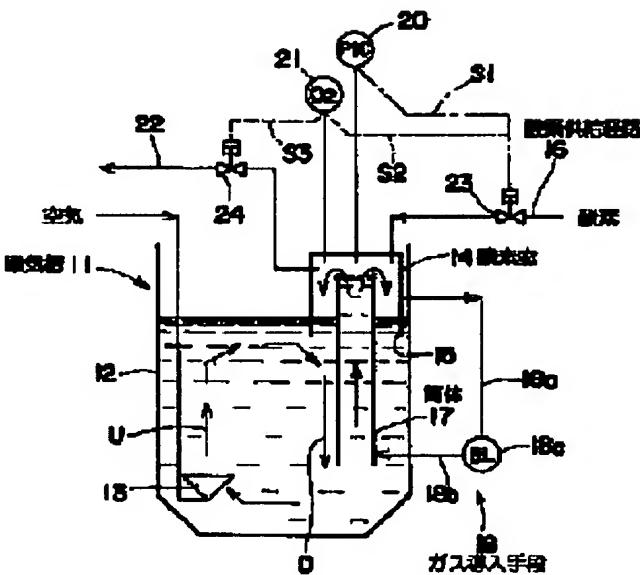
**Application number:** JP19970177190 19970702

**Priority number(s):** JP19970177190 19970702

**Report a data error here**

## Abstract of JP11019678

**PROBLEM TO BE SOLVED:** To enhance dissolving efficiency of oxygen into a mixture soln and to sufficiently raise a dissolved oxygen concn. **SOLUTION:** In this device, a box-shaped oxygen chamber 14 in which an open part 15 provided only at a bottom part is opened in water at the water surface part of an aeration tank 11 and an oxygen supplying passage 16 supplying the oxygen into the oxygen chamber 14 are provided. Moreover, a cylindrical body 17 in which an upper end part is opened to the inside of the oxygen chamber 14 and a lower end part is opened in the water is provided and a gas introducing means 18 introducing the gas in the oxygen chamber 14 to the bottom part of the cylindrical body 17 is provided.



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**CLAIMS**

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**[Claim(s)]**

[Claim 1] In the aerobic water treating unit of the revolution style type which forms a revolution style in the mixed liquor in a tub by the aeration from the aeration means formed in the pars basilaris ossis occipitalis While preparing the box-like oxycoia room as for which opening prepared only in the pars basilaris ossis occipitalis carries out opening underwater and preparing the oxygen supply path which supplies oxygen in this oxygen interior of a room in the water surface part of the downward flow part in said revolution style The aerobic water treating unit characterized by having prepared the tubed passage as for which the upper limit section carries out opening to said oxygen interior of a room, and the lower limit section carries out opening underwater, and establishing a gas installation means to introduce the gas of said oxygen interior of a room into the lower part of said tubed passage.

[Claim 2] The lower limit section of said tubed passage is an aerobic water treating unit according to claim 1 characterized by carrying out opening near the bottom of the tank section.

[Claim 3] The amount of the gas introduced into the lower part of tubed passage from said gas installation means is an aerobic water treating unit according to claim 1 characterized by setting up so that the rate of flow of the mixed liquor in the tubed passage which goes up by the airlift effectiveness by this gas may become quicker than the rate of flow of the mixed liquor which descends said downward flow part.

[Claim 4] Said oxycoia room is an aerobic water treating unit according to claim 1 characterized by having the oxygen supply control means which controls the amount of supply of oxygen by the signal from this oxygen density measurement means while having an oxygen density measurement means to measure an indoor oxygen density.

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[Translation done.]

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## DETAILED DESCRIPTION

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### [Detailed Description of the Invention]

#### [0001]

[Field of the Invention] This invention relates to the aerobic water treating unit suitable for the revolution style type aerator used for the waste-water-treatment facility which processes bottom wastewater with an activated sludge process, concerning an aerobic water treating unit.

#### [0002]

[Description of the Prior Art] As equipment for processing bottom wastewater with an activated sludge process, the revolution style type aerator is used widely. As this revolution style type aerator is shown in the top view of drawing 2, the side-attachment-wall side of another side in which the diffuser 2 is not formed forms the revolution style used as downward flow by putting in order and installing two or more diffusers 2 in the pars-basilaris-ossis-occipitalis 1 side of an aerator 1, blowing off air etc. from this diffuser 2, and forming upward flow in the mixed liquor of a diffuser upper part part. Thus, while attaining equalization of active sludge concentration or dissolved oxygen concentration by agitating the mixed liquor which formed the revolution style in the aerator 1 and processed water (wastewater) and active sludge mixed, it has prevented that sludge accumulates on the bottom of the tank section. in addition, the inflow section of wastewater and the outflow section of treated water omit illustration (the following -- the same).

[0003] Although it is called for on the other hand that the dissolved oxygen concentration in mixed liquor is enough when processing bottom wastewater with an activated sludge process using such an aerator, oxygen may become insufficient temporarily with a superfluous load. In such a case, in order to compensate dissolved oxygen concentration conventionally, the air content used for aeration is increased, or it is made to carry out aeration of oxygen or the air into mixed liquor apart from the air for aeration. However, by the approach of only carrying out aeration of oxygen or the air into mixed liquor, in order that air bubbles may surface on the water surface immediately, vapor-liquid contact time becomes inadequate and there is un-arranging [ that the dissolution effectiveness of oxygen is low ].

[0004] While forming a well-closed container 3 independently [ an aerator 1 ] and supplying oxygen from piping 4 in this well-closed container 3, as shown in drawing of longitudinal section of drawing 3 since it is such, after drawing out and introducing the mixed liquor in an aerator 1 with a pump 5 and contacting mixed liquor and oxygen within a well-closed container 3, the oxygen supplier formed so that it might return to an aerator 1 by piping 6 is proposed. Moreover, in order to raise the contacting efficiency of the mixed liquor within a well-closed container 3, and oxygen, he is trying to supply the churning material 7, such as Raschig ring, in a well-closed container 3 with this equipment.

[0005] With the equipment of the above-mentioned configuration, oxygen is not as air bubbles, and since it is sendable into an aerator 1 in the condition of having dissolved into mixed liquor, it has the advantage that most oxygen which oxygen is not emitted to atmospheric air and supplied is effectively utilizable.

#### [0006]

[Problem(s) to be Solved by the Invention] However, in some which are shown in above-mentioned drawing 3, the well-closed container was needed apart from the aerator, installation costs, such as churning material and a pump, were required, and when power expense started the mixed liquor into a well-closed container, and press fit of oxygen, there was un-arranging [ that the installation of a well-closed container was also needed ].

[0007] Then, this invention can raise the dissolution effectiveness of the oxygen to the inside of mixed liquor with an easy facility configuration, and aims at offering the aerobic water treating unit equipped with a means by which dissolved oxygen concentration can fully be raised.

[0008]

[Means for Solving the Problem] In order to attain the above-mentioned purpose, the aerobic water treating unit of this invention In the aerobic water treating unit of the revolution style type which forms a revolution style in the mixed liquor in a tub by the aeration from the aeration means formed in the pars basilaris ossis occipitalis While preparing the box-like oxyecoa room as for which opening prepared only in the pars basilaris ossis occipitalis carries out opening underwater and preparing the oxygen supply path which supplies oxygen in this oxygen interior of a room in the water surface part of the downward flow part in said revolution style It is characterized by having prepared the tubed passage as for which the upper limit section carries out opening to said oxygen interior of a room, and the lower limit section carries out opening underwater, and establishing a gas installation means to introduce the gas of said oxygen interior of a room into the lower part of said tubed passage.

[0009] Furthermore, the amount of the gas which introduces the lower limit section of said tubed passage into the lower part of tubed passage from having carried out opening near the bottom of the tank section, and said gas installation means While forming an oxygen density measurement means to measure an indoor oxygen density in having set up so that the rate of flow of the mixed liquor in the tubed passage which goes up by the airlift effectiveness by this gas might become quicker than the rate of flow of the mixed liquor which descends said downward flow part, and said oxyecoa room It is characterized by establishing the oxygen supply control means which controls the amount of supply of oxygen by the signal from this oxygen density measurement means.

[0010]

[Embodiment of the Invention] Drawing 1 is the schematic diagram showing the example of 1 gestalt of the aerobic water treating unit of this invention. While a flat-surface configuration is a rectangular thing, and the aerator 11 of this example of a gestalt performs aeration churning in a tub in the bottom surface part of one side attachment wall 12 and supplies oxygen to mixed liquor like the aerator shown in said drawing 2, the diffuser 13 for generating a revolution style is formed in the single tier in parallel with a side attachment wall 12. The revolution style which has the upward flow U as shown by the arrow head, and downward flow D in an aerator 11 by the gas (air) spouted from this diffuser 13 is formed.

[0011] And the oxyecoa room 14 is established in the water surface part of the part of the downward flow D in the above-mentioned revolution style. This oxyecoa room 14 is the box-like thing in which only the pars basilaris ossis occipitalis carried out opening, and it is installed so that the opening 15 of a pars basilaris ossis occipitalis may carry out opening into mixed liquor. Moreover, the barrel 17 for forming the tubed passage as for which the upper limit section carries out opening into an oxyecoa room 14, and the lower limit section carries out opening to the oxygen supply path 16 for supplying the gas (these being hereafter called oxygen content gas) containing oxygen or oxygen indoors underwater [ near the pars basilaris ossis occipitalis of an aerator 11 ], and a gas installation means 18 to introduce the gas in an oxyecoa room 14 into the lower part of a barrel 17 are formed in the oxyecoa room 14.

[0012] The above-mentioned gas installation means 18 is formed of piping 18b which is open for free passage in the lower part of piping 18a which is open for free passage in an oxyecoa room 14, and a barrel 17, and blower (BL)18c for feeding gas, and the gas in an oxyecoa

room 14 is introduced into the lower part of a barrel 17 through piping 18b by operating blower 18c from piping 18a.

[0013] Namely, an air lift pump is formed in oxyecoa room 14 part by said barrel 17 and the above-mentioned gas installation means 18, the inside of a barrel 17 is accompanied to the gas (air bubbles) going up, and the mixed liquor of the bottom of the tank section will be in the condition of going up and overflowing the upper limb of a barrel 17 for the inside of a barrel 17 in an oxyecoa room 14. Although the location of the upper limb of a barrel 17 and the margo inferior can be suitably set up at this time, the contact time of the mixed liquor and gas (oxygen) which go up the inside of a barrel 17 can fully be taken by lengthening a barrel 17 as much as possible. Moreover, as for the upper limb of a barrel 17, it is desirable to make into a location recoverable in an oxyecoa room 14 the whole quantity of the gas which flows out of a barrel 17, and in order to prevent a back flow, it is usually desirable [ an upper limb ] to set it as a location higher than the water surface. Therefore, while carrying out opening of the margo inferior of a barrel 17 near the bottom of the tank section, it is optimal to consider as the condition of having made the upper limb projecting from the water surface in an oxyecoa room 14, when raising the dissolution effectiveness of a churning operation of mixed liquor, or oxygen. Moreover, although the location which blows gas into a barrel 17 may be the pars intermedia of a barrel 17, it can raise the contacting efficiency of mixed liquor and gas by introducing gas from the lower limit section.

[0014] Furthermore, the pressure gage (PIC) 20 which detects an indoor pressure, an oxygen density measurement means (oxygen analyzer O2) 21 to measure the oxygen density in indoor gas, and the exhaust pipe 22 which discharges indoor gas are formed in the oxyecoa room 14. Moreover, the oxygen supply control means (oxygen supply valve) 23 which controls the amount of supply of oxygen is formed in said oxygen supply path 16, and the signals S1 and S2 from a pressure gage 20 and an oxygen analyzer 21 are inputted into the closing motion mechanical component of this oxygen supply valve 23; respectively. Furthermore, the discharge valve 24 is formed in said exhaust pipe 22, and the signal S3 from an oxygen analyzer 21 is inputted into the closing motion mechanical component of this discharge valve 24.

[0015] Thus, when dissolving oxygen into mixed liquor with the air lift pump which consists of the oxyecoa room 14 and barrel 17 which were formed, and a gas installation means 18, while supplying oxygen content gas in an oxyecoa room 14 from the oxygen supply path 16, blower 18c is operated, an air lift pump is operated, and by making the oxygen content gas in an oxyecoa room 14 into drive gas, the mixed liquor of the bottom of the tank section is turned in an oxyecoa room 14, and is \*\*\*\*(ed). The mixed liquor which mixed liquor and gas contacted in the state of the turbulent flow in this \*\*\*\* and within the barrel 17, the dissolution of the oxygen to the inside of mixed liquor was promoted, and oxygen fully dissolved, and the gas containing the oxygen which did not dissolve flow into an oxyecoa room 14 out of the upper limb of the barrel 17 which is the outlet of an air lift pump.

[0016] The oxygen content mixed liquor which flowed out of the air lift pump rides return and in the style of revolution in an aerator 11 from the lower opening 15 of an oxyecoa room 14, and is distributed in an aerator 11. On the other hand, oxygen content gas is attracted by piping 18a from the inside of an oxyecoa room 14, and circulates in the lower part of a barrel 17 with the gas installation means 18.

[0017] Therefore, since the oxygen which did not dissolve into mixed liquor circulates from an oxyecoa room 14 to a barrel 17 with the gas installation means 18, without being emitted to atmospheric air, the amount of oxygen emitted vainly is almost lost, and the supplied oxygen can be utilized effectively. And it is not necessary to prepare a well-closed container independently [ an aerator 11 ], and required power expense is only blower 18c, since supply of the oxygen content gas into an oxyecoa room 14 can also be performed by abbreviation ordinary pressure, an installation cost and power expense can be reduced compared with the conventional oxygen supplier, and correspondence to an existing facility can also be performed easily.

[0018] Moreover, although the amount of circulating gas of arbitration can be chosen if the

capacity (the amount of circulating gas) introduced into the lower part of a barrel 17 with the gas installation means 18 changes with the die length and the sizes of a barrel 17 and the upward flow of mixed liquor can be formed in a barrel 17. By setting up more amounts of circulating gas so that the rate of flow of the mixed liquor in the barrel 17 which goes up by the airlift effectiveness may become quicker than the rate of flow of the mixed liquor which descends said downward flow D part. While being able to raise the contacting efficiency of the mixed liquor within a barrel 17, and oxygen, the distributed effectiveness to the downward flow D of the oxygen dissolving water which flowed out of the barrel 17 can also be raised, and oxygen can be efficiently supplied to the whole mixed liquor in an aerator 11. [0019] If oxygen is supplied into mixed liquor from the oxyecoia room 14 as mentioned above, since the capacity in an oxyecoia room 14 will decrease according to the amount in which an oxygen content melts into mixed liquor, the pressure in an oxyecoia room 14 declines. If the pressure in this oxyecoia room 14 falls below to a predetermined pressure, said pressure gage 20 will detect this, will output a valve-opening signal to said oxygen supply valve 23, and will supply oxygen content gas in an oxyecoia room 14 from the oxygen supply path 16. Moreover, when a pressure rises more than a predetermined pressure, a clausium signal is outputted to the oxygen supply valve 23 from a pressure gage 20.

[0020] On the other hand, since carbon dioxide gas and nitrogen are contained in the air bubbles which surface in an oxyecoia room 14 out of mixed liquor even when high grade oxygen is supplied as oxygen content gas in an oxyecoia room 14, into the oxyecoia room 14, these will be accumulated gradually and the dissolution effectiveness of oxygen will also fall. Thus, if the oxygen density in an oxyecoia room 14 turns into below predetermined concentration, while said oxygen analyzer 21 will detect this and will output a valve-opening signal to said oxygen supply valve 23, a valve-opening signal is outputted also to said discharge valve 24, and indoor gas is extruded from a discharge valve 24 by the oxygen content gas from the oxygen supply path 16. If the oxygen density in an oxyecoia room 14 becomes by this more than predetermined concentration, an oxygen analyzer 21 will output a clausium signal to the oxygen supply valve 23 and a discharge valve 24. In addition, even if the oxygen density in an oxyecoia room 14 is arbitrary and it supplies atmospheric air from the oxygen supply path 16, although appropriate effectiveness is acquired, it can raise the dissolution effectiveness of oxygen sharply the concentration which supplies oxygen or oxygen enrichment gas indoors, and exceeds 21% which is an oxygen density in atmospheric air about an indoor oxygen density, and by controlling to become 80% or more of concentration preferably.

[0021] Moreover, although supply operation of the oxygen from an oxyecoia room 14 to the inside of mixed liquor is performed by operating blower 18c, this operation may be performed continuously and you may carry out intermittently at spacing set up suitably. Furthermore, the dissolved oxygen concentration of the mixed liquor in an aerator 11 is measured with a dissolved oxygen concentration meter (not shown), and it may be made to carry out when dissolved oxygen concentration turns into below predetermined concentration. moreover, without establishing a control means like said pressure gage 20 and oxygen analyzer 21, during operation, by supplying superfluous oxygen content gas continuously slightly from the oxygen supply path 16, and making indoor gas overflow small [ every ] in mixed liquor from the opening 15 of the pars basilaris ossis occipitalis of an oxyecoia room 14, reduction of the indoor amount of oxygen and are recording of gas other than oxygen can be boiled to some extent, and can be suppressed.

[0022] Furthermore, an oxyecoia room 14 can also install plurality according to the magnitude of an aerator 11, and the oxygen supply to need, and can also form two or more barrels 17 (air lift pump) in an oxyecoia room 14. Moreover, the tubed passage for forming an air lift pump is possible also for forming using the tank wall of an aerator 11, for example, can install a dashboard in a tub corner and can also form tubed cross-section triangle-like passage.

[0023] Moreover, the level gage which replaces with said pressure gage 20 and detects the oil level in an oxyecoia room 14 is installed, vertical movement of the oil level accompanying

indoor pressure fluctuation is detected, and it may be made to perform closing motion control of said oxygen supply valve 23. Furthermore, even if an aerator 11 is the thing of a draft tube mold, the same effectiveness can be acquired, and it can apply also to the aerobic water treating unit by the oxidation contact method.

[0024]

[Example] It experimented using a glass tank with width of face of 60cm, a depth [ of 40cm ], and a depth of 50cm as an aerator. In the oxyecoia room, the pipe made of a transparent plastic with a diameter [ of 5cm ] and a die length of 30cm was used for the barrel by the product made of a transparent plastic using the thing of the shape of a closed-end cylinder with a diameter [ of 10cm ], and a depth of 7cm. Moreover, the barrel was installed so that upper limit might turn from the water surface up. The pressure gage opened the oxygen supply valve, when the pressure of the oxygen interior of a room became atmospheric pressure, and when a pressure was set to atmospheric pressure +10mmAq, it set it up so that an oxygen supply valve might be closed. Moreover, the oxygen analyzer opened the oxygen supply valve and the discharge valve, when the oxygen density of the oxygen interior of a room fell to 80%, and when the oxygen density went up to 90%, he set up so that an oxygen supply valve and a discharge valve might be closed.

[0025] The generalization oxygen-transfer coefficient (KL<sub>a</sub>) in Shimizu was measured using this experimental device. Consequently, while supplying oxygen gas to the oxyecoia room to the generalization oxygen-transfer coefficient having been 6, when operating a blower, supplying gas 5l./m to the barrel lower part and operating an air lift pump, the generalization oxygen-transfer coefficient of the case which carried out aeration of the air at 10l./m from the diffuser improved to 18.

[0026]

[Effect of the Invention] Since the oxygen supply to the inside of mixed liquor can be increased according to the aerobic water treating unit of this invention as explained above, efficient water treatment can be performed by sufficient dissolved oxygen concentration.

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[Translation done.]

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**DESCRIPTION OF DRAWINGS**

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**[Brief Description of the Drawings]**

[Drawing 1] It is the schematic diagram showing the example of 1 gestalt of the aerobic water treating unit of this invention.

[Drawing 2] It is the top view showing an example of a revolution style type aerator.

[Drawing 3] It is drawing of longitudinal section showing an example of the conventional oxygen supplier.

**[Description of Notations]**

11 [ -- Opening, 16 / -- An oxygen supply path, 17 / -- A barrel, 18 / -- A gas installation means 18c / -- A blower, 20 / -- A pressure gage, 21 / -- An oxygen analyzer, 22 / -- An exhaust pipe, 23 / -- An oxygen supply valve, 24 / -- A discharge valve, D / -- Downward flow, U / -- Upward flow ] -- An aerator, 12 -- side attachment wall, 13 -- A diffuser, 14 -- An oxyecia room, 15

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[Translation done.]

Fig. 1

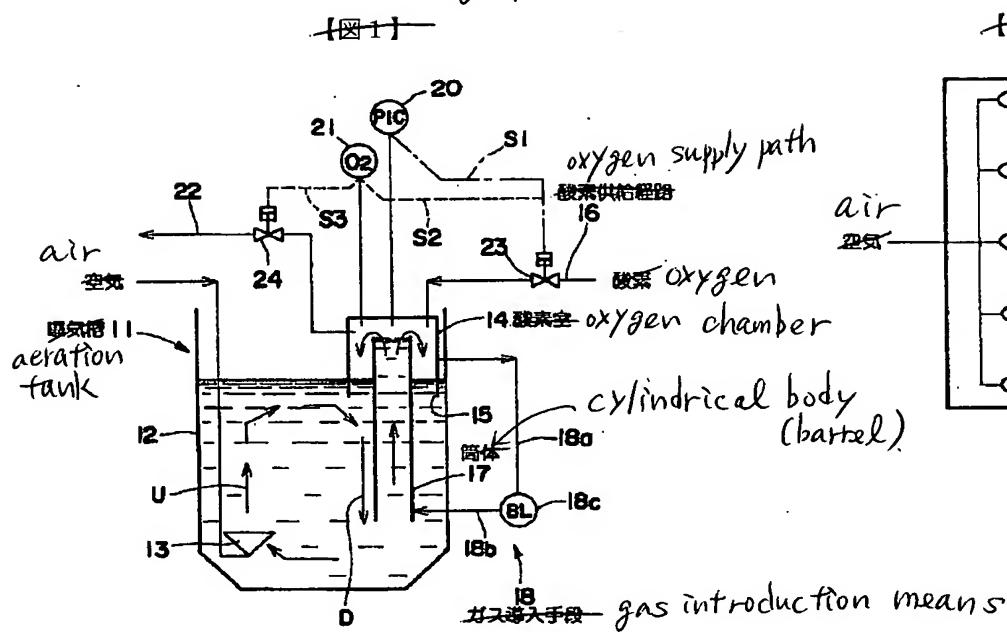


Fig. 2

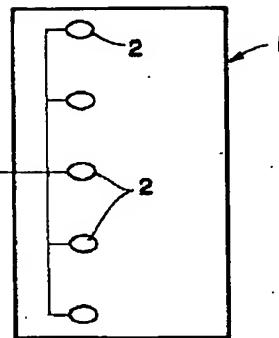


Fig. 3

